Wind Power's Consumer Benefits

American Wind Energy Association | www.awea.org

Consumers in wind states save money

New DOE data show that the states that use the most wind energy have seen the largest electric rate declines.

Newly released DOE data show that consumers in the states that use the most wind energy have fared far better than consumers in states that use less wind energy.

The 11 states that produce more than 7 percent of their electricity from wind energy have seen their electricity prices fall by 0.37 percent over the last 5 years, while all other states have seen their electricity prices increase by 7.79 percent over that time period (1).

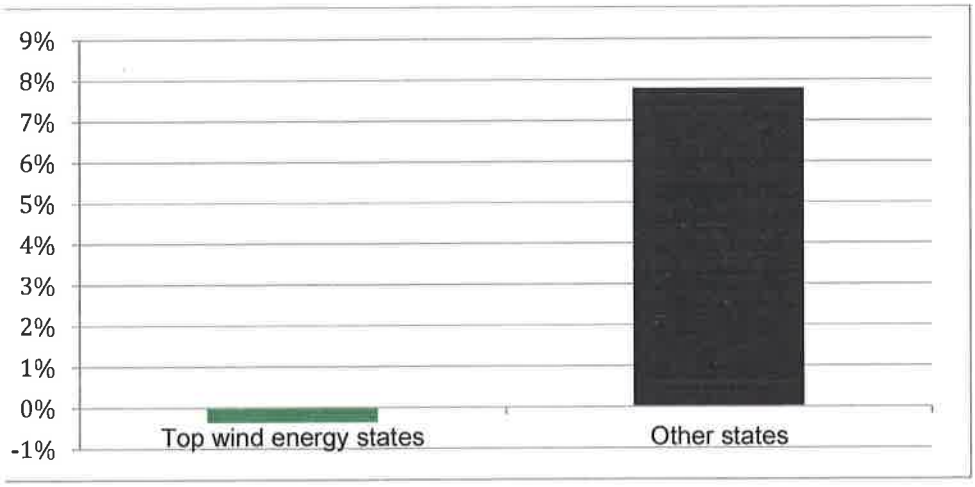
The following charts summarize the change in power prices for consumers in Texas, Wyoming, Oregon, Oklahoma, Idaho, Colorado, Kansas, Minnesota, North Dakota, South Dakota, and Iowa compared to all other states. Between the end of 2008 and the end of 2013, these eleven states more than doubled their operating wind power, increasing their wind capacity by 116 percent.

Many factors influence the price of electricity in addition to wind energy, such as fuel prices, consumer demand, generation mix, and others. However, based on the data above and the studies discussed below, there is clear evidence that wind energy helps to keep consumers' electricity prices down.

With these types of savings, it's easy to understand why the majority of Americans support wind power Americans knows a good deal when they see it. According to a Navigant Research poll, 72 percent of Americans support wind power (2), while a poll last month found more than 90 percent of Kansans (3) support greater use of wind power.

	Electricity price change, 2008-2013
States >7% wind powered	- 0.37%
Other states	+ 7.79%

Electricity Price Changes, 2008 - 2013



This confirms DOE's previous data indicating that, for the period 2005-2010, wind-heavy states saw their electricity prices increase at less than half the rate of states with the least wind energy:

Ranking for wind power	Electricity price increase, 2005-2010
Bottom 30 wind power states	26.74%
Top 10 wind power states	10.94%
Top 20 wind power states	15.72%

How does wind power benefit consumers?

Zero fuel cost wind energy keeps energy costs low through several key mechanisms:

Displacing the most expensive, least efficient power plants

Zero-fuel cost wind energy directly displaces the output of the most expensive and least efficient power plants that are currently operating. Like the functioning of almost any market, electricity market operators rank power plants based on their cost of producing an incremental amount of electricity. They then start by using the least-cost power plants first, and then move up the list (the supply curve) until they have enough electricity to meet demand. The power plant rank order is based on the cost of producing an incremental amount of electricity, so only fuel costs and variable O&M costs are considered.

As a result, wind energy and other zero fuel cost resources are always used first, and they are used to displace the most expensive power plant that otherwise would have operated. Because that is almost always the least efficient fossil-fired power plant, adding wind energy significantly reduces fossil fuel energy costs, as well as pollution

Wind energy decreases electricity prices

A potentially far larger benefit for consumers is that wind energy drives down the market price for all electricity that is being sold in the market, not just the wind electricity. The market price for all electricity purchasers is set by the last and most expensive power plant that was chosen to operate.

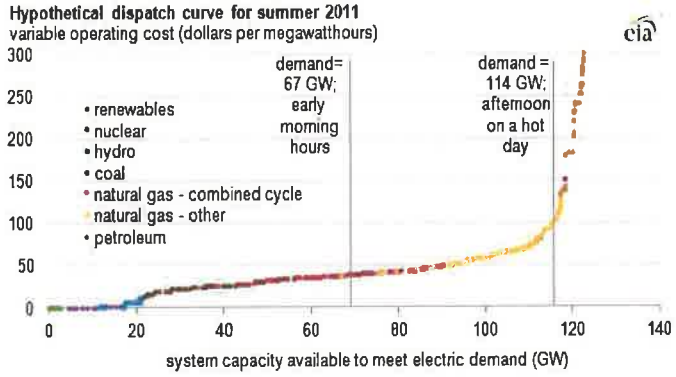
By offsetting the most expensive power plants that are currently operating, wind energy typically causes the electricity price to be set by a more efficient and less expensive power plant. This results in a lower electricity price for all market purchasers. Because the supply curve of generation options is often quite steep (see the conceptual illustration at right), even a modest amount of additional supply greatly reduces the market electricity price. Moreover, because this market price applies to all electricity sold in the market, not just the wind electricity, the savings are further multiplied.

Wind energy reduces prices in fossil fuel markets

Through a similar mechanism, additional wind energy supply also reduces prices in fossil fuel markets, providing savings for all fossil fuel users. Wind energy offsets a mixture of coal and gas that depends on the regional energy mix, and in many regions wind energy significantly reduces natural gas prices. Because the natural gas price curve is often very steep, and because the market price applies to all transactions in the market, wind energy can produce large savings for all natural gas users by driving down the market price.

Wind energy acts as hedge against price volatility

Wind energy also protects consumers against uncertainty about the price of fossil fuels. The risk of fossil fuel price volatility makes consumers worse off, and one of the most effective tools for reducing that risk is by diversifying the energy mix with zero fuel cost wind energy. Wind energy helps to hedge against volatility in the price of fossil fuels (4), much like a fixed rate mortgage protects consumers from interest rate fluctuations.



Studies confirm wind power drives electricity prices down

At least 15 studies confirm wind energy drives electricity prices down

More than a dozen studies conducted by independent grid operators, state governments, academic experts, and others have found that wind energy benefits consumers by reducing electricity prices:

Illinois found that wind energy reduces consumer electricity costs by $177 million per year.
http://www2.illinois.gov/ipa/Documents/201304-IPA-Renewables-Report.pdf

Massachusetts found the state Renewable Portfolio Standard has a 3:1 benefit-to-cost ratio, producing annual net benefits of $217 million.
http://www.mass.gov/eea/docs/doer/publications/electricity-report-jul12-2011.pdf

Synapse Energy Economics found that doubling wind energy deployment in PJM (Mid-Atlantic and Great Lakes states) beyond existing RPS requirements would save consumers a net $6.9 billion per year, after accounting for all wind and transmission costs.
http://www.synapse-energy.com/Downloads/SynapseReport.2013-05.EFC.Increased-Wind-Power-in-PJM.12-062.pdf

Six peer-reviewed academic studies, discussed in this literature review, confirm that wind energy reduces electricity market prices.
http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf

Charles River Associates found that a wind and transmission investment in the Southwest Power Pool would provide $1 billion in annual consumer savings and net savings of $628-728 million per year after accounting for wind and transmission costs.
http://www.crai.com/uploadedFiles/RELATING_MATERIALS/Publications/BC/Energy_and_Environment/files/Southwest%20Power%20Pool%20Extra-High-Voltage%20Transmission%20Study.pdf

The New England Independent System Operator's wind integration study found that 14% wind energy reduced electricity prices by around 10%, while 24% wind energy reduced electricity prices by 15%.
http://variablegen.org/wp-content/uploads/2013/01/newis_report.pdf

Another Synapse Energy Economics analysis found large investments in wind energy in the MISO (Midwest) region would reduce power supply costs by $3 billion to $9.4 billion per year, or between $63 and $200 per customer per year, after accounting for the cost of transmission.
http://www.synapse-energy.com/Downloads/SynapseReport.2012-08.EFC.MISO-T-and-Wind.11-086.pdf

Georgia Tech and Duke University found expanded renewable energy use in the South would reduce energy bills by $14 billion in 2020 and $23 billion in 2030.
http://nicholasinstitute.duke.edu/sites/default/files/publications/renewable-energy-in-the-south-paper.pdf

Colorado's Xcel Energy's wind purchases were found to save consumers $251 million on net, and additional wind purchases would save a net total of $438 million.
http://interwest.org/wp-content/uploads/2013/08/2006-08-211.pdf

The New England Independent System Operator's January 2014 analysis found that the region's proposed wind projects would reduce electricity market expenses by $1.074 billion per year, or $119 in savings per each MWh of wind energy.
http://iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/reports/2014/2012_economic_study_final.docx

Utilities know wind power is a good deal for their customers

Leading utilities publicly support wind energy

Dozens of utilities have taken advantage of declining wind energy costs to lock in record low prices that will reduce electricity costs for their customers while also protecting against increases in fossil fuel prices. As the utilities have explained:

Public Service Company of Oklahoma – In announcing three long-term wind power contracts in February 2014, the Public Service Company of Oklahoma (PSO) reported the move could reduce costs for customers by $53 million within the first year (5). PSO president and chief operating officer said "these contracts were based on extraordinary pricing opportunities that will provide significant savings for our customers."

Xcel Energy Minnesota - "Wind prices are extremely competitive right now (6), offering lower costs than other possible resources, like natural gas plants." - David Sparby, president & CEO of Xcel Energy's Northern States Power, announcing 600 MW of new wind power contracts in 2013.

Arkansas Electric Cooperative - "Low-cost wind energy provides [Arkansas Electric Cooperative Corp.] with a hedge against fluctuating natural gas energy prices … We will continue to pursue energy options that allow AECC's member cooperatives to provide reliable electricity at the lowest possible cost (7)." - Duane Highley, president & CEO of Arkansas Electric Cooperative Corp., after signing a 150-MW wind contract in 2013

MidAmerican Energy - "The expansion is planned to be built at no net cost to the company's customers and will help stabilize electric rates over the long term by providing a rate reduction totaling $10 million per year by 2017 (8), commencing with a $3.3 million reduction in 2015." – MidAmerican Energy Co. 2013 press release after the Iowa Utilities Board approved the addition of 1,050 MW of wind generation in Iowa.

Southern Company, Georgia Power - Southern Company made its third large wind energy purchase in April 2013. In a press release, the CEO of Georgia Power explained that "Adding wind energy to our generation mix underscores our commitment to a diverse portfolio that offers clean, safe, reliable, sustainable and low-cost electricity for years to come (9)."

Southern Company, Alabama Power - In 2011, Alabama Power, this subsidiary of Southern Company made its first wind power purchase. In signing off on the contract, the Alabama Public Service Commission noted that the "price of energy from the wind facility is expected to be lower than the cost the company would incur to produce that energy from its own resource … with the resulting energy savings flowing directly to the Company's customers (10)."

Xcel Energy Colorado - In a late-2011 order approving a wind power purchase by Xcel Energy, the state Public Utilities Commission stated that "the contract will save ratepayers $100 million on a net-present-value basis over its 25-year term under a base-case natural gas price scenario" while providing the opportunity to "lock in a price for 25 years (11)."

American Electric Power - In early 2012, American Electric Power subsidiary Southwestern Electric Power Co. (SWEPCO) signed long-term power purchase agreements for a total of 358.65 MW from wind projects in Texas, Oklahoma and Kansas. SWEPCO said in a news release that it estimated an average decrease in cost to its customers of about 0.1 cents per kilowatt-hour over a 10-year period starting in 2013 (12).

Technology advances are bringing down the cost of wind energy

Declining wind energy costs expand wind power's consumer benefits

Wind turbine prices and wind energy costs have dropped sharply in recent years. Technology improvements are rapidly making wind turbines more productive and reducing costs, while expanded domestic manufacturing is achieving economies of scale and reducing transportation costs. In fact, the Department of Energy's Wind Technologies Market Report 2012 confirms that the cost of wind energy has declined by 43 percent over the last four years (13).

The report explains that: 1) the capital cost to develop wind power continues to drop, 2) the average cost to purchase electricity provided by wind is falling (see chart below), 3) the productivity of wind turbines continues to increase, and 4) 70% of the value of wind turbines installed in the U.S. now carries a "Made in the USA" label.

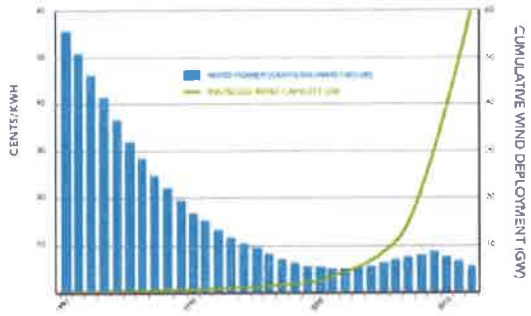


Chart shows the declining cost of wind energy and the rise of installed wind capacity
Source: DOE Revolution Now, 2013

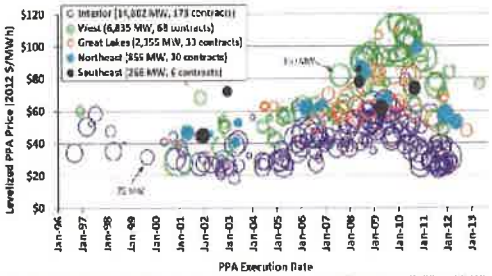


Chart shows average contract price for wind energy has dropped 43% between 2008 and 2012
Source: DOE Wind Technologies Market Report 2012

The Investment analysis firm Lazard also confirms that wind energy is one of the most affordable options for new electricity generation, alongside new natural gas units:

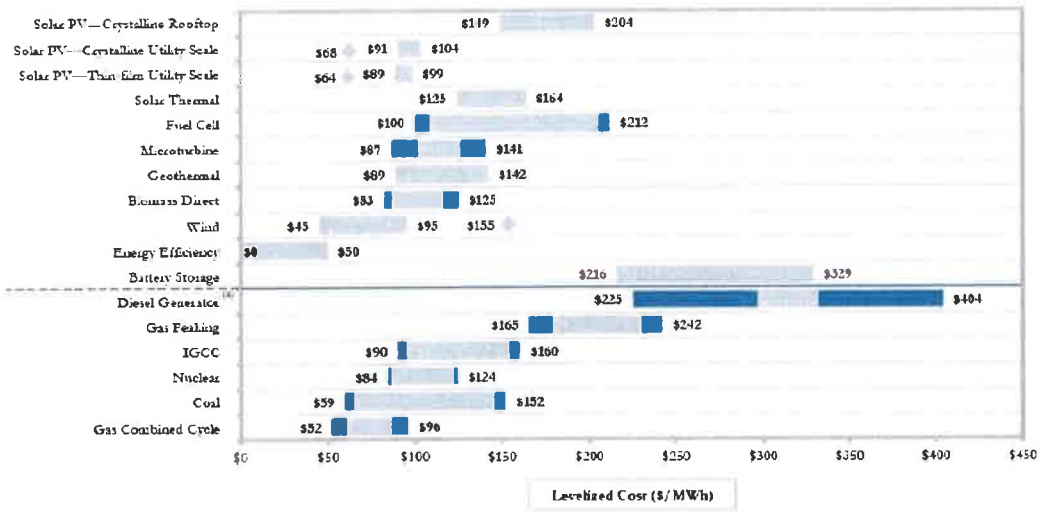


Chart shows wind energy is cost competitive with new generation. Source: Lazard, 2013

Citations

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13. Department of Energy, 2012 Wind Technologies Report.